



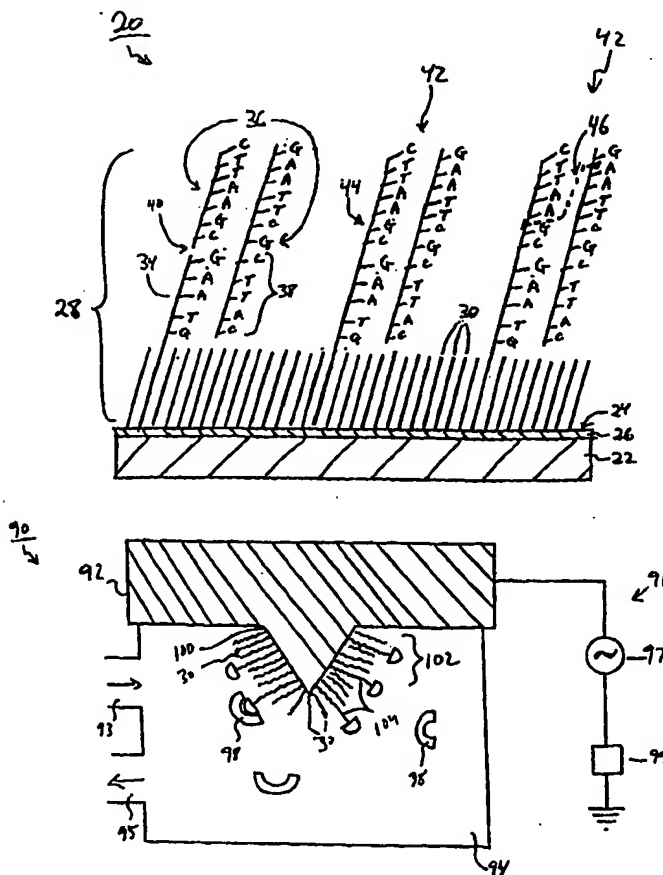
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(54) Title: ELECTRONIC-PROPERTY PROBING OF BIOLOGICAL MOLECULES AT SURFACES

(57) Abstract

A technique for immobilizing biological molecules, in particular nucleic acid strands, is described. Biological molecules immobilized at surfaces can be used in electron-transfer detection techniques in which a binding partner of a biological molecule is brought into proximity of the surface-immobilized biological molecule, an electrical potential created between the two biologically-binding species, and electron transfer through the species determined. Another technique involves immobilizing a biological molecule such as a protein, DNA, etc., at a surface via a self-assembled monolayer, affecting the biological molecule via, for example, biological binding, inducing a change in conformation via a prion, etc., and detecting an electronic property change in the molecule via a change in impedance associated with an electronic circuit addressed by the biological molecule. This technique facilitates combinatorial array detection articles.



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INTERNATIONAL SEARCH REPORT

II. National Application No

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C12Q1/68 G01N33/53

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 C12Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 93 22678 A (BAYLOR COLLEGE MEDICINE ;HOUSTON ADVANCED RES CENTER (US); MASSACH) 11 November 1993 see whole document, esp. claims and pages 13, line 9 ff	1-12, 19-39
X	CUNNINGHAM B. C. & WELLS J. A.: "Comparison of a structural and a functional epitope" J. MOL. BIOL., vol. 234, - 1993 pages 554-563, XP002071221 see esp. results page 555, 2. column and figure 1a	40

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

I. International Application No

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 97 44651 A (AUSTRALIAN MEMBRANE & BIOTECH ;UNIV SYDNEY (AU); HARDING MARGARET) 27 November 1997 see whole doc. esp. page 7 ,line 16 - page 8 ,line 19 and claims ---	1-12,20, 36
P,X	WO 97 41425 A (PENCE INC ;UNIV MCGILL (CA)) 6 November 1997 see whole document, esp. claims and figures ---	1-12,20, 36
A	MURPHY C.J. ET AL.,: "Long-range photoinduced electron transfer through a DNA helix" SCIENCE, vol. 262, - 12 November 1993 pages 1025-1029, XP002071222 cited in the application see esp . page 1028, 3. column ---	1-39
A	SIGAL G. B. ET AL.,: "A self-assembled monolayer for the binding and study of histidine-tagged proteins by surface plasmon resonance" ANAL. CHEM., - 1996 pages 490-497, XP002071235 see the whole document ---	13-18
A	"Kinetic characterization of DNA hybridization using real-time BIA" PHARMACIA BIOSENSOR, APPLICATION NOTES, no. 306, - 1994 XP002071223 see the whole document ---	1-39
A	NILSSON P. ET AL.,: "DNA sequencing with BIA" BIA JOURNAL, vol. 2, no. 2, - 1995 page 25 XP002071224 see the whole document ---	1-39
P,A	US 5 620 850 A (BAMDAD CYNTHIA C ET AL) 15 April 1997 see the whole document ---	13-38
A	NGUYEN J. ET AL.,: "Prion protein peptides induce alpha-helix to beta-sheet conformational transitions" BIOCHEMISTRY, vol. 34, - 1995 pages 4186-44192, XP002071225 see esp. page 4191, last para. -----	40-51

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 98/01144

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9322678 A	11-11-1993	EP 0638173 A JP 7508831 T US 5653939 A	15-02-1995 28-09-1995 05-08-1997
WO 9744651 A	27-11-1997	AU 2757897 A	09-12-1997
WO 9741425 A	06-11-1997	AU 2563897 A AU 2563997 A WO 9741424 A	19-11-1997 19-11-1997 06-11-1997
US 5620850 A	15-04-1997	NONE	

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